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ASSESSMENT OF PHYSICO-CHEMICAAL PROPERTIES, ANTIFUNGAL AND ANTI-SPROUTING EFFICACY OF ESSENTIAL OILS (*MORINGA OLEIFERA* AND *SESAME INDICUM* OIL)

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ABSTRACT: *This study was aimed at evaluating the physico-chemical properties, antifungal and anti-sprouting efficacy of Moringa oleifera and Sesame indicum seed oil extracts. Physico-chemical parameters were determined and compared for both oils. There was significant ($p < 0.05$) difference observed between the refractive values (1.4570 and 1.4633), free fatty acid (FFA) (2.04 and 3.21 mg $KOHg^{-1}$), acid values (6.08 and 6.43 mg $KOHg^{-1}$), pH values (4.55 and 5.33), saponification values (210.75 and 215.57 mg of $KOHg^{-1}$), peroxide values (5.40 and 5.80 meqO_2/kg), specific gravity (0.8897 to 0.9161 g/cm^3) and yield (8.25% and 32.02%) for cold press extracts of Sesame and Moringa seed oils respectively. In vitro antifungal efficacy of both oils (M. oleifera and S. indicum) against Aspergillus niger shows a range of 3.63% to 58.18% inhibition. No anti-sprouting effect was recorded across all concentrations tested for the two oils. However, the antifungal potential of both seed oil extracts (Moringa and Sesame) exhibited moderate inhibitory properties with the highest percentage inhibition at 48 hrs.*

KEYWORDS: Moringa Oleifera, Sesame Indicum, Antifungal, Anti-sprouting, Inhibition.

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INTRODUCTION

Enhancing the antimicrobial, anti-sprouting effects of different oils is very crucial for treating resistant infectious pathogenic microbes. Several plants with special properties are considered potential sources of unique antimicrobial functions. *Moringa oleifera* is widely used as a functional food and medicinal plant that has high nutritional values and diverse pharmacological activities due to the essential phytochemicals existent in its leaves, pods, and seeds (Palizban *et al*., 2015).

Also, Sesame seed is locally consumed as a staple food in Nigeria, especially in the South-West and Middle Belt areas, where it is richly cultivated by local subsistence farmers; thus, the use of sesame oil as a food source may account for the high fecundity among the adult male population in these areas (Norouzi *et al*., 2011).

Commercially, Moringa oil is known as "Behenoil," due to the presence of appreciable amounts of behenic acid along with palmitic and stearic acids as well as oleic acid (more than 70%) (Anwar *et al*., 2005; Zhao & Zhang, 2013). Abd-Rabou *et al*. (2016) addressed and explored the potential of Moringa oleifera seed oil as an impact compound to promote the mechanism of mitochondrial apoptosis of cancer cell death.

Therefore, both oils have been used as medicine or for pharmaceutical and antifungal properties used as fungicides. They have also been used against various gram-positive and gram-negative bacteria (Aviara *et al*., 2015; Li *et al.*, 2010).

Furthermore, the pharmacological studies of both Moringa and Sesame oil have claimed various biological activities including antibacterial, antifungal, antioxidant, antifertility, and anticancer effects (Ramachandran *et al*., 1980; Abd-Rabou *et al*., 2016)). The oils have also been reportedly used in the treatment of arthritis, rheumatism, and hypertension (Mahmood *et al*., 2010). A major issue facing the developing nations is food scarcity. Salami and Popoola (2007) and Kana *et al*. (2012) reported that nearly one billion people are challenged by severe hunger in these developing nations, of which 10% are reported dead from hunger-related complications. Food security and sustainability is one of the ways of addressing food scarcity and shortage due to activities of microorganisms after harvesting (FAO/WHO, 2012). According to Arya (2010), post-harvest pathogens can be divided into those that penetrate the produce on-farm, but develop in their tissues only after harvest, during storage or marketing, on one hand; and those that initiate penetration and colonization during or after harvest, on the other. Enormous post-harvest losses in roots and tubers have been attributed to fungal deteriorations (Khatoon *et al*., 2012; 2016).

Several fungi such as *Penicillium* sp., *Ceratocystis fimbriata, Aspergillus niger, Diaporthe batatalis,* and *Aspergillus flavus* are responsible for the post-harvest decay of sweet potato (Onuegbu 2002; Oduola *et al.,* 2018). Roots and tubers are perishable and a lot of post-harvest losses occur during storage due to high physiological activities and activities of microorganisms that enter bruises received during harvesting as well as the inherent high moisture content of fresh roots, which promote both microbial deterioration and unfavorable biochemical changes in the commodity (Oduola *et al.,* 2018). Thus, in this study, the antimicrobial and anti-sprouting activities of both oils (Moringa and Sesame) as a potential agent in inhibiting microbial attack and sprouting were investigated.

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MATERIALS AND METHODS

Sample collection

This study was carried out at the Nigerian Stored Product Research Institute (NSPRI), km 3 Asa-dam Area, Ilorin Kwara State, Nigeria. *Moringa oleifera* seeds that were used for this work were procured from Oja Oba, Ilorin. Sesame seeds for oil extraction were purchased from Wadata market, Makurdi, Benue State. Standard culture media and all other reagents of analytical grade were provided by Nigerian Stored Products Research Institute, Ilorin and Mich Nigerian Ltd.

Extraction and characterization of the oils

Oil extraction and preliminary activities on the oils

The oils from *Moringa oleifera* and *Sesamum indicum seeds* were produced using the cold press extraction method described by Kate *et al*. (2014), and then centrifuged at 3000 rpm (2,431 x g) for 3 min to separate the water and residues from the oil. The oil was stored in amber bottles or plastic at 4°C until analyzed. Extraneous materials from the mature *Moringa oleifera* seeds and *Sesame indicum* seeds were removed, washed and sundried for 3 days and subsequently crushed mechanically via the use of a mechanical grinder to particulate sizes of about 2 mm, to obtain a larger surface area. Finally, resulting samples were artificially dried using a tray drier (DHG-9055A, SERICO, China) at a temperature of 50°C for 2 hrs.

Determination of Percentage Yield

Each sample was weighed and recorded before extraction (after oven drying) and after the extraction process. The mass of oil extract obtained from the two seeds were weighed individually and the percentage yield was calculated using the equation below:

Percentage Yield = Weight of Oil/Weight of Sample x 100

Determination of physico-chemical properties and ph value of the extracted oils

Iodine value, peroxide value, saponification value, specific gravity, refractive index, viscosity and colour were determined by AOAC (2012) method. The free fatty acid (FFA) value is usually regarded as half the acid value of the oil extract and it was obtained. pH was determined using a pH meter.

Isolation and characterisation of spoilage microorganisms in selected roots and tubers

Collection of infected root and tuber crops sample

Infected root and tuber crop samples were identified by physical examination and then collected randomly from the root and tuber crops barn. Three different root and tuber crops (yam, cocoyam and sweet potato), 3 each from the three sources (9) with various rot symptoms were collected, placed in polythene bags and brought to the NSPRI food processing laboratory for processing and further analysis.

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Isolation of pathogenic fungi

Fungal pathogens were isolated on potato dextrose agar (PDA) from the tubers using direct plate method. A sterile scalpel was used to cut 3 mm x 3 mm sections of tissue from the tubers cutting across healthy portions to the decayed portion where the pathogens are likely to be more active (Al-Hetar *et al*., 2010).

Identification of fungal pathogens

The fungal isolates were characterized using their colonial morphology on the plates. Parameters such as colour of the colonies, nature of the hyphae, appearance of the colonies and the growth rates were considered for proper characterization of the isolates (Iwuagwu *et al.*, 2018).

Inhibition of mycelial radial growth of *A. niger* using the extracted oils

The *in vitro* antifungal activity of extracted oils was determined using food poisoning method by placing a 6 mm diameter disc from the pure culture of all the selected fungal isolates (*A. niger*) in the centre of PDA dishes containing 1.0 ml of the oils. Petri dish containing only PDA with sterile distilled water was used as control. All the Petri dishes were incubated at room temperature (28±2°C). Daily, radial growth measurements were taken from 24 to 72 hours. The percentage inhibition of radial mycelial growth (PIRG) was calculated using the formula described by Al-Hetar *et al*. (2010).

$$\text{PIRG} = \frac{R1-R2}{R1} \text{ x } 100$$

where R1 = mycelial growth in control plates, and R2 = mycelial growth in treated plates.

Anti-sprouting efficacy of Sesame and Moringa oils

The screening of the different extracts and oils for anti-sprouting tests using tomato seeds for preliminary studies was carried out, according to Olaleye (2019).

Statistical analysis

Data obtained were subjected to analysis of variance (ANOVA) and tested for significant difference among treatments by New Duncan's Multiple Range F-Test (DMRT) at ($p<0.05$) using SPSS software package version 20.0.0 (IBM Statistics).

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RESULTS AND DISCUSSION

Physico-chemical properties of *Sesame indicum* and *Moringa oleifera* seed oils extracted via cold press method.

The physicochemical properties of the extracted oils which include refractive index, specific gravity, percentage yield, moisture content, viscosity, colour, acid value, peroxide value, iodine value, saponification value, free fatty acid and pH are presented in Tables 1 and 2.

However, there was significant difference in the value of the parameters during the six months storage, e.g. acid value of the Sesame oil ranged between 6.07 mgKOH/g and 6.09 mgKOH/g while that of Moringa oil ranged from 6.40 mgKOH/g to 6.43 mgKOH/g. The oils are stable under the storage condition.

Peroxide value of extracted oils

The peroxide values of cold pressed extracted Sesame and Moringa oils were between 5.40 – 5.80 meqO_2/kg oil respectively. The value of cold pressed Sesame oil (5.80 meqO_2/kg) was higher than that of Moringa oil (5.41 meqO_2/kg). These values were higher than the 2.00 meqO_2/kg oil reported by Paul (2013), and the range (1.5 – 2.4 meqO_2/kg oil) given by the codex standard. According to Akinoso *et al.* (2010), oil obtained from another Nigerian Sesame seed variety (Goza-25) had peroxide value that varied from 3.9 to 15.4 meq/kg. These values are significantly ($p < 0.05$) different from values obtained from varieties in other locations. A low peroxide value, as seen in this study, increases the suitability of the oil for a long storage due to low level of oxidative and lipolytic activities,

Saponification value of the extracted oils

The saponification values of Sesame and Moringa cold press ranged from 210.75 to 215.57 mg of KOH g-1 oil, different from each other and higher than those reported in the literature for Sesame and Moringa oils. According to Tunde-Akintunde *et al.* (2012), the high saponification value suggests the use of the oils in the production of liquid soap, shampoos and lather shaving creams.

pH value of the extracted oils

The pH values of the Sesame and Moringa oils (cold pressed extracted) were different from each other. The values ranged from 4.55 to 5.33 for cold pressed Moringa and Sesame extracted oils.

Acid value of the extracted value

The acid value is an indication of the amount of fatty acid present in the oil sample. The acid value of the cold press Sesame and Moringa oils were 6.08 to 6.43 mg KOH/g respectively. The acid value for Sesame oil in this study was higher than the value (5.46 mg KOH/g oil) reported by Paul (2013). Tunde-Akintunde *et al.* (2012) reported that the acid value of some local Sudanese and imported Sesame seed cultivars varied from 3.1 – 6.6 mg/g for local and 3.1 – 9.3 mg/g for the imported. For Moringa seed oil, the acid value (6.43 mg KOH/g) was higher than the acid value (4.00 mg/KOHg-^{1}) specified for edible oil by FAO/WHO and 6.00 mg/KOHg-^{1} specified by codex. Paul (2013) reported that the acid value is a reflection of the pH value of oil; that is, as the acid value increases, the pH of oil decreases.

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Free fatty acid of the extracted oils

The free fatty acid (FFA) of Sesame and Moringa seed oils (cold pressed extracted) ranges from 2.04 – 3.21 mg $KOHg^{-1}$. For Sesame seed oil, this value was lower than the value (2.82 % and 3.00 %) reported by Paul (2013) and codex standard respectively. However, the value for Moringa was higher than that of Sesame (2.04 mg $KOHg^{-1}$). The lower values of the free fatty acid of the oils indicated that the oils were less prone to oxidation and to turning rancid. The result shows further that Sesame oil was less prone to oxidation than Moringa oil.

Percentage (%) yield of the oils

The percentage oil yield for traditional cold pressed Sesame and Moringa seed oils showed a significant ($p < 0.05$) difference. The yields were 8.25% and 32.02% respectively. Oil extracted by traditional cold press method showed lower yield due to losses during the separation of the oil from the water. This result is in conformity with the work by Lalas and Tsaknis (2002).

Refractive index of the extracted oils

There was a significant ($p < 0.05$) difference observed between the refractive index of cold pressed Sesame and Moringa oils (1.4570 and 1.4633). According to Paul (2013), refractive index is used mainly to measure the change in unsaturation as the fat or oil is hydrogenated. The refractive index of oils depends on their molecular weight, fatty acids chain length, degree of unsaturation and degree of conjugation. The cold pressed extracted Moringa oil showed a refractive index of 1.4633, which falls out of the range (1.469 – 1.479) reported by codex standard.

Specific gravity of the extracted oils

The specific gravity of both oil extracted from Sesame and Moringa seeds, using cold pressed method, ranged from 0.8897 to 0.9161 g/cm^3 (cold press), which is higher than the value (0.915 g/cm^3) reported by Warra *et al*. (2011). The specific gravity of Sesame oil as obtained in this study was lower than the reference range (0.913 – 0.929) of codex standard. The values for Moringa oils were found to be higher than the international standard for edible oil.

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Table 1: Physical and chemical characteristics of the cold pressed Sesame seed oil.

Parameter	Months					
	1	2	3	4	5	6
Refractive index	1.4561^{d}±0.00	1.4556^{c}±0.00	1.4531^{a}±0.00	1.4561^{d}±0.00	1.4570^{e}±0.00	1.4534^{b}±0.00
Specific Gravity	.9128^{c}±0.00	.9127^{c}±0.00	.9128^{c}±0.00	.9062^{a}±0.00	.9094^{b}±0.00	.9161^{d}±0.00
Viscosity(mpa/s)	32.42^{a}±0.00	32.41^{a}±0.00	32.42^{a}±0.00	32.43^{a}±0.02	32.42^{a}±0.00	32.42^{a}±0.00
Colour l	26.59^{a}±0.01	26.59^{a}±0.00	26.59^{a}±0.00	26.59^{a}±0.00	26.60^{a}±0.00	26.59^{a}±0.01
a	4.07^{a}±0.00	4.07^{a}±0.00	4.07^{a}±0.01	4.08^{a}±0.00	4.07^{a}±0.01	4.08^{a}±0.00
b	36.59^{a}±0.01	36.59^{a}±0.00	36.58^{a}±0.00	36.59^{a}±0.00	36.58^{a}±0.01	36.59^{a}±0.00
Acid Value	6.08^{ab}±0.01	6.08^{ab}±0.00	6.09^{b}±0.00	6.07^{a}±0.00	6.07^{a}±0.00	6.09^{b}±0.00
Peroxide Value	5.79^{ab}±0.00	5.78^{a}±0.01	5.79^{ab}±0.00	5.78^{a}±0.00	5.79^{ab}±0.00	5.80^{b}±0.00
Iodine Value	83.67^{a}±0.00	83.69^{ab}±0.01	83.71^{b}±0.01	83.71^{b}±0.00	83.72^{c}±0.00	83.70^{b}±0.00
Saponification Value	210.75^{a}±0.34	211.08^{ab}±0.33	212.65^{b}±0.34	211.97^{ab}±0.33	213.86^{c}±0.33	213.87^{c}±0.34
pH	5.33±0.00	5.32±0.00	5.33±0.00	5.33±0.00	5.33±0.00	5.33±0.00

Values represent Mean±SE of triplicate readings. Means with different superscripts across each row are significantly different ($p<0.05$)

Table 2: Physical and chemical characteristics of the cold pressed Moringa seed oil.

Parameter	Months					
	1	2	3	4	5	6
Refractive index	1.4633^{c}±0.00	1.4603^{b}±0.00	1.4607^{b}±0.00	1.4636^{c}±0.00	1.4593^{a}±0.00	1.4593^{a}±0.00
Specific Gravity	.8910^{d}±0.00	.8897^{a}±0.00	.8903^{bc}±0.00	.8906^{c}±0.00	.8900^{b}±0.00	.8900^{b}±0.00
Viscosity(mpa/s)	81.49^{a}±0.01	81.50^{ab}±0.01	81.48^{a}±0.00	81.48^{a}±0.01	81.49^{a}±0.00	81.51^{b}±0.00
Colour l	24.33^{b}±0.01	24.31^{a}±0.01	24.32^{ab}±0.01	24.31^{a}±0.01	24.31^{a}±0.01	24.32^{ab}±0.00
a	3.72^{ab}±0.00	3.73^{b}±0.00	3.71^{a}±0.01	3.71^{a}±0.01	3.72^{ab}±0.00	3.72^{ab}±0.01
b	45.94^{a}±0.01	45.93^{a}±0.00	45.95^{a}±0.00	45.93^{a}±0.00	45.93^{a}±0.01	45.94 ^{a}±0.01
Acid Value	6.44^{b}±0.01	6.43^{b}±0.00	6.41^{a}±0.01	6.40^{a}±0.00	6.40^{a}±0.01	6.43^{b}±0.00
Peroxide Value	5.40^{a}±0.01	5.41^{ab}±0.01	5.40^{a}±0.01	5.42^{b}±0.01	5.41^{ab}±0.01	5.42^{b}±0.01
Iodine Value	64.81^{bc}±0.01	64.80^{b}±0.00	64.82^{c}±0.00	64.75^{a}±0.27	64.79^{b}±0.00	64.81^{bc}±0.00
Saponification Value	215.52^{bc}±0.27	215.57^{c}±0.30	215.25^{b}±0.27	215.53^{bc}±0.27	215.52^{bc}±0.00	214.99^{a}±0.00
pH	4.55^{a}±0.00	4.55^{a}±0.00	4.55^{a}±0.00	4.55^{a}±0.00	4.54^{a}±0.00	4.55^{a}±0.00

Values represent Mean±SE of triplicate readings. Means with different superscripts across each row are significantly different ($p<0.05$)

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Table 4: Characterization of fungal isolates

Isolate	Colonial morphology	Microscopy	Probable identified fungus
F1	Blue green colonies.	Conidia in long chains on repeatedly branched conidiophores resembling a brush-like head (penicillus). Conidiophores smooth, relatively short. Penicillia mycelia arranged very irregular and asymmetrical with branches of various lengths.	*Penicillium digitatum*
F2	Colonies with loose white to yellow mycelium rapidly become dark brown to black on the development of conidia. Colonies light green-yellow.	Brownish black conidiophores and yellow to green conidia with dark sclerotia. Microscopically, conidiophores arise from a foot-cell, catenate (basipetal) conidia on phialides (1 or 2 series) on vesicles.	*Aspergillus* flavus.
F3	White to dark grey colonies, fast growing and filling the petri dish with dense cottony mycelium, producing mass of sporangia.	Non-septate mycelium with roots like rhizoids, black columellae, sporangiophores in clusters and dark sporangia containing dark to pale spores.	*Rhizopus stolonifer*.
F4	Black colour with white edges	Conidia have a black colour in the culture. The colonies are well developed; hypha profusely branched, septate and hyaline. Flat and smooth conidia are borne in chains at the tip of the sterigmata.	*Aspergillus niger*
F5	Flaky velvet surface showing greenish pigmentation or gray green colour colony	Mycelium has smooth wall, unseriated pyriform vesicles with glubose small in column and smooth conidia surface.	*Aspergillus fumigatus*

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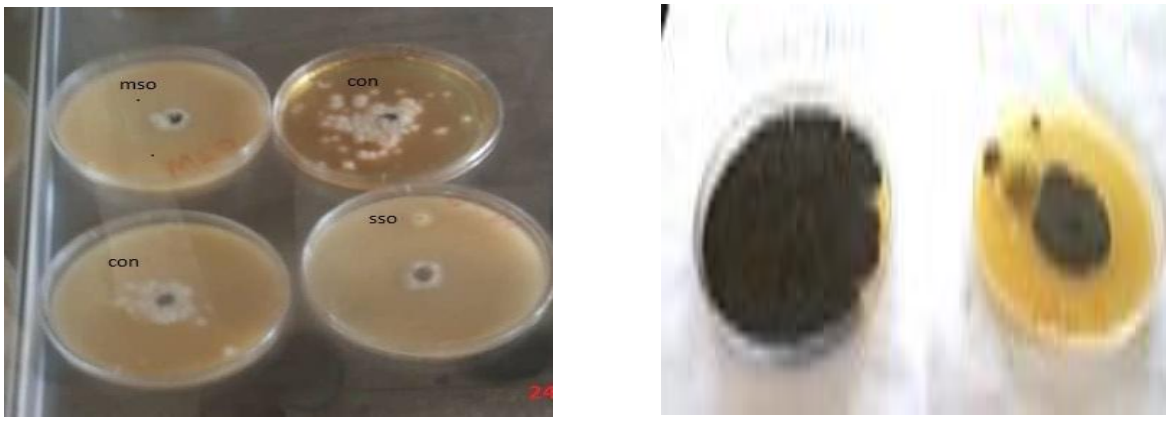
Table 5: The in-vitro result of antifungal efficacy of both Sesame and Moringa oils on *Aspergillus niger*

S/N	TIME (Hrs)	(MSO)	(SSO)	(CON)	% Inhibition (%)	
		Diameter of Growth (mm)	Diameter of Growth (mm)	Diameter of Growth (mm)	MSO	SSO
1	24	22	23	32	31.25	28.25
2	48	31	23	55	43.63	58.18
3	72	41	33	62	33.87	46.77

Means of three replicates

*****NB MSO = Moringa seed oil, SSO = Sesame seed oil



A B

Plate 3(A&B): Picture showing inhibition test of the oils (MSO and SSO) and control against *Aspergillus niger* at 24 and 72 hours of incubation respectively.

The result of the in vitro antifungal efficacy of both Sesame and Moringa oils (Table 5) shows that the percentage inhibition of Sesame oil (58.18%) was the highest compared to that of Moringa oil (43.63%) at 48 hours, which later reduced at 72 hours in both oils. The result is in agreement with the work of El-Mohammedy and Abdallah (2014) who reported that Moringa seed oil at 1% inhibits *F. oxysporium* and many other pathogenic fungi by 50%. This result is contrary with the report of Deepavali *et al*. (2012) who reported that Sesame oil has no inhibitory properties on *Aspergillus sp.*

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Anti-sprouting screening of the extracted oils

Sesame oil

The 0.1 ml concentration of the oil showed no germination; it was completely dry after day 4. The 0.3 ml concentration showed no growth, 0.5 ml sprouted but stopped midway while the 1.0 ml of Sesame oil showed prolonged sprouting which could be as a result of the density of the oil causing high moisture sedimentation in the Petri-dish, which promotes the growth of the seeds. These results were all observed after day 4. The pictorial representation is shown below in Plate 1.

Plate 1: Showing growth pattern in the screening for anti-sprouting using Sesame oil at different smear/fume cover volumes

Oringa oil

0.1ml showed sprouting but with a dry base and slight mould growth; 0.3 ml showed thin sprouting with dried stunted growth. 0.5 ml of Moringa oil also showed thin sprouting, as the case seemed, with a dried base too; the higher concentration of 1.0 ml showed growth. As in the case of Sesame oil, this could also be as a result of the density of the oil causing high moisture sedimentation in the Petri-dish, which promotes the growth of the seeds. The pictorial representation is shown below in Plate 2.

Though the anti-sprouting potentials of the oils were not pronounced, Sesame seed oil has higher anti-sprouting potentials. At lower concentration, the oils (Sesame and Moringa) seem to be more active as anti-sprouting agents, while at higher concentrations, the set-up is damper, thereby promoting sprouting.

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Plate 2: Showing growth pattern in the screening for anti-sprouting using Moringa oil at different smear/fume cover volumes

CONCLUSION

The development of a biological means of control such as coating of plant material from an edible oil seed plant extract has shown impressive results in reducing post-harvest loss of agricultural products in crops. However, it was observed in this study that Sesame and Moringa oil extracts have some potential bioactive and physico-chemical properties in adequate proportions that determine and support their potential fungal inhibitory properties, thus preventing and inhibiting the growth of fungal pathogens.

REFERENCE

[1]. Abd-Rabou A. A., ZoheirKhM A., Kishta M. S., Shalby A. B., & Ezzo M. I.,(2016) :Nano-micelle of *Moringa oleifera* seed oil triggers mitochondrial cancer cell apoptosis," *Asian Pacific Journal of Cancer Prevention*, 17, 4929–4933.

[2]. Al-Hetar, M.Y., Zainal Abidin, M.A., Sariah, M. & Wong, M.Y. (2010).Antifungal activity of chitosan against *Fusarium oxysporum* f. sp.*Cubense*. *Journal of Applied Polymer Science*, 120, 2434-2439

Article DOI: 10.52589/AJAFS-S9JNEH80
DOI URL: https://doi.org/10.52589/AJAFS-S9JNEH80

[3]. Akinoso R., Aboaba S.A., & Olayanju T.M.A.(2010) :Effects of moisture content and heat treatment on peroxide value and oxidative stability of un-refined sesame oil. *African Journal of Food, Agriculture, Nutrition and Development,* 10, 4268-42850.
[4]. AOAC. (2012). Association of Analytical Chemist. *Official Methods of Analysis International*.17thedition.Gaithersburg, Md, USA, Association of Analytical Chemistry; 2012.
[5]. Arya, A. (2010). Recent advances in the management of plant pathogens: Botanicals in the fungal pest management. In: *Management of fungal plant pathogens*. Arya A. and Perello, A. E. (Eds). UK, CAB International,1-25
[6]. Aviara N. A., Musa W. B., Owolarafe O. K., Ogunsina B. S., &Oluwole F. A.,(2015) :Effect of processing conditions on oil point pressure of *Moringa oleifera* seed," *Journal of Food Science and Technology*, 52, 4499–4506.
[7]. Deepavali, D.S. & Nilima, K.(2012). Antifungal activity of selected plant derived oils and some fungiciede against seed borne fungi of maize. *European Journal of Experimental Biology* 2(5), 1693-1696
[8]. El-Mohammedy, R. S. R. & Abdallah, A.M.(2014).Antifungal activity of moringa oleifera oil and seed extract against some pathogenic fungal. *Middle East Journal of Agricultural Research,* 3 (2), 242-249.
[9]. FAO/WHO Report (2012). Basic Concepts of Food Security: *Definition, Dimensions and Integrated Phase Classification*.
[10]. Iwuagwu, C. C., Umechuruba, C. I., Ononuju, C. C. & Nwogbqa, A. C.(2018). Assessment of Seed-Borne Plant Pathogenic Fungi associated with Rice Crop in South-Eastern Nigeria. *Journal of Agricultural, Science and Technology* (8), 68-75
[11]. Kana, H. A., Aliyu, I. A. & Chammang, H. B. (2012). Review on neglected and underutilized root and tuber crops as food security in achieving the millennium development goals in Nigeria. *Journal of Agriculture and Veterinary science Science*, 4, 27-3
[12]. Lalas S, &Tsaknis J. (2002): Characterization of Moringa Oleifera seed oil variety "Periyakulam *Journal of Food Composition Analysis*, 15, 65-77.
[13]. Li S.,Lin M.M.,Toprak M.S., Kim D.K., & Muhammed M., (2010):Nanocomposites of polymer and inorganic nanoparticles for optical and magnetic applications. *Nanotechnology Reviews,*1, 5214
[14]. Mahmood M., Mugal T., & Haq I.U., (2010): *Moringa oleifera*: a natural gift—a review," *Journal of Pharmaceutical Sciences and Research*, 2, 775–781
[15]. Norouzi P.,Rashed H.,Alipour A., Faridbod F., Shahtaheri S. J., & Ganjali M. R., (2011):PVC membrane sensor and wire coated electrode for determination of flurazepam," *International Journal of Electrochemical Science*, 6, 2312–2322.
[16]. Oduola A. A., Awojobi K. O., Adeyemo S. M.,(2018): Microorganisms Associated with Post Harvest Spoilage of Sweet Potatoes in Ile-Ife, Nigeria, *Journal of Microbiology Research*, 8, 1-8.
[17]. Olaleye, O.O. (2019):Effect of treatment with oils extracted from moringa (moringa oleifera) and sesame (sesamum indicum) seeds on the quality and shelf life of fresh tomato fruits: *Phd thesis*, Benue state university, Markurdi
[18]. Onuegbu, B.A. (2002). Fundamental of crop protection. Agro-science consult and extension Unit, RSUT. 237.
[19]. Palizban A., Bakhshaei B.,&Asghari G.,(2015) :Quantitativeanalysis of the nutritional components in leaves and seeds ofthe Persian *Moringa peregrina* (Forssk.) Fiori," *Pharmaceutical Research*, 7, 242–248.

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[20]. Paul E.D.,(2013):Extraction and characterization of oil from sesame seed. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 4, 752
[21]. Salami, O. A. & Popoola, O. O. (2007): Thermal control of some postharvest rot pathogens of Irish potato (Solanum tuberosum L.). *Journal of Agricultural Science*, 52, 17-31.
[22]. Tunde-Akintunde T.Y., Oke M.O., Akintunde. B.O., Uduak G., Akpan Ed., (2012), Sesame seed, oilseeds. ISBN: 978-953-51-0665-4.
[23]. Warra A.A., Wawata I.G., Hassan L. G., Gunu S.Y., & Aujara K.M., (2011).Extraction and physicochemical analysis of some selected Northern Nigerian industrial oils. *Scholars Research Library: Archives of applied science research*, .3, 536-541.

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